AMENDMENTS TO THE CLAIMS

Listing of Claims

Claims 1 to 6 canceled

7. (Currently amended) ~~The~~ A hydraulic torque converter ~~of claim 1~~, comprising:

a housing arranged to rotate about a predetermined axis, to confine a supply of hydraulic fluid and to receive torque from an output element of a prime mover;

a pump disposed in and arranged to rotate with said housing about said axis;

an annular turbine coaxial with said pump, disposed in said housing and arranged to receive torque from the fluid in said housing in response to rotation of said pump;

a rotary input element coaxial with said housing;

a rotary output member arranged to transmit torque between said input element and at least one of said pump, said turbine and said housing;

a bypass clutch engageable to transmit force between said pump and said turbine during predetermined stages of operation of the torque converter; and

at least one torsional vibration damper in a power flow between said housing and said output member, including an input, an output coaxial with said housing and said input and rotatable relative to said input, and energy storing

means arranged to oppose rotation of said input and said output relative to each other; wherein said bypass clutch includes a member connected with one of said input and said output at a plurality of points spaced apart from each other in a circumferential direction of said turbine, said one of said input and said output and said member of said bypass clutch which are connected to each other at said plurality of points being provided with means disposed at least in part radially inwardly of said points and arranged to reduce the stiffness of said at least one of said input and output and said member of said clutch, as seen in the direction of said axis.

8. (original) The torque converter of claim 7, wherein said stiffness reducing means includes an annular array of recesses in said at least one of said input, said output and said member of said bypass clutch.

9. (original) The torque converter of claim 8, wherein said recesses are adjacent said points.

10. (original) The torque converter of claim 9, wherein each of said recesses includes an arcuate slit partially surrounding a different one of said points.

11. (original) The torque converter of claim 10, wherein each of said slits includes first and second end portions and at least one of said end portions has a width exceeding that of an intermediate portion of the respective slit.

12. (original) The torque converter of claim 10, wherein each of said

recesses includes an end portion extending radially outwardly beyond at least one of said points.

13. (original) The torque converter of claim 9, wherein said recesses include slits provided in said input and said input includes a radially outermost portion, each of said slits having an open end at said radially outermost portion of said input.

14. (original) The torque converter of claim 9, wherein each of said recesses includes a slit and each of said slits has an enlarged end disposed at a first radial distance from said axis, said points being located at a second radial distance from said axis and said second radial distance at least approximating said first radial distance.

15. (original) The torque converter of claim 7, wherein said stiffness reducing means is provided in said input at a first stage of assembly of said damper with said housing and said output member, said input undergoing a shaping during a second stage following said first stage of assembly of the damper.

16. (currently amended) The torque converter of claim 7 ~~1~~, wherein said at least one damper is provided in a power flow between said bypass clutch and said output member.

17. (currently amended) The torque converter of claim 7 ~~1~~, wherein said at least one damper is disposed in a power flow between said turbine and

said rotary output member.

18. (currently amended) The torque converter of claim 7 ~~1~~, wherein said input of said torsional vibration damper comprises at least two walls and further comprising means for connecting at least one of said walls with a member of said bypass clutch.

19. (currently amended) The torque converter of claim 7 ~~1~~, wherein said bypass clutch includes a portion adjacent a portion of said damper and further comprising an annular array of fasteners spacedly surrounding said axis and connecting said portions of said bypass clutch and said damper to each other, and further comprising means for reducing the stiffness of at least one of said portions in the axial direction of said housing including recesses provided in at least one of said portions adjacent said fasteners.

20. (original) The torque converter of claim 19, wherein said recesses are open as seen radially outwardly away from said axis and closed radially inwardly of neighboring fasteners.

21. (original) The torque converter of claim 19, wherein said recesses alternate with said fasteners.

22. (original) The torque converter of claim 21, wherein the widths of at least some of said recesses--as seen in the circumferential direction of said portions--increase in a direction toward said axis.

23. (original) The torque converter of claim 20, wherein said recesses include closed radially inner end portions closest to said axis and bounded by at least substantially circular surfaces of said at least one portion.

24. (original) The torque converter of claim 20, wherein the widths of at least some of said recesses--as seen in the circumferential direction of said portions--decrease in a direction toward said axis.

25. (original) The torque converter of claim 24, wherein said at least one portion has an undulate peripheral surface and said recesses are provided in said peripheral surface.

Claim 26 canceled.

27. (currently amended) ~~The~~ A hydraulic torque converter ~~of claim 26~~, comprising:

a housing arranged to rotate about a predetermined axis, to confine a supply of hydraulic fluid and to receive torque from an output element of a prime mover;

a pump disposed in and arranged to rotate with said housing about said axis;

an annular turbine coaxial with said pump, disposed in said housing and arranged to receive torque from the fluid in said housing in response to rotation of said pump;

a rotary input element coaxial with said housing;

a rotary output member arranged to transmit torque between said input element and at least one of said pump, said turbine and said housing;

a bypass clutch engageable to transmit force between said pump and said turbine during predetermined stages of operation of the torque converter; and

at least one torsional vibration damper in a power flow between said housing and said output member, including an input, an output coaxial with said housing and said input and rotatable relative to said input, and energy storing means arranged to oppose rotation of said input and said output relative to each other;

wherein said bypass clutch comprises a first portion and said damper includes a second portion, and further comprising springs connecting said first portion with said second portion with limited freedom of movement in the direction of said axis, and wherein said springs include an annular array of leaf springs spacedly surrounding said axis.

28. (currently amended) The torque converter of claim ~~26~~ (27), wherein said second portion includes said input of said damper.

29. (currently amended) The torque converter of claim ~~26~~ (27), further comprising means for non-rotatably connecting said input of said damper with said turbine.

30. (currently amended) The torque converter of claim ~~26~~ (27), wherein said first portion includes a piston of said bypass clutch.

31. (original) The torque converter of claim 30, wherein said piston and said housing include annular portions frictionally contacting each other in the engaged condition of said bypass clutch, said springs including leaf springs connecting said input with a radially outermost part of said portion of said clutch.

Claim 32 canceled

33. (Currently amended) ~~The~~ A hydraulic torque converter ~~of claim 32~~, comprising:

a housing arranged to rotate about a predetermined axis, to confine a supply of hydraulic fluid and to receive torque from an output element of a prime mover;

a pump disposed in and arranged to rotate with said housing about said axis;

an annular turbine coaxial with said pump, disposed in said housing and arranged to receive torque from the fluid in said housing in response to rotation of said pump;

a rotary input element coaxial with said housing;

a rotary output member arranged to transmit torque between said input element and at least one of said pump, said turbine and said housing;

a bypass clutch engageable to transmit force between said pump and said turbine during predetermined stages of operation of the torque converter; and

at least one torsional vibration damper in a power flow between said housing and said output member, including an input, an output coaxial with said housing and said input and rotatable relative to said input, and energy storing means arranged to oppose rotation of said input and said output relative to each other;

wherein said energy storing means includes an annulus of coil springs and means for limiting the movability of said coil springs radially of said axis, and wherein said means for limiting includes a ring and said springs have convolutions surrounding said ring with limited freedom of movement of said springs and said ring relative to each other radially of said axis.

34. (original) The torque converter of claim 33, further comprising means for connecting said ring to said damper.

35. (original) The torque converter of claim 34, wherein said ring is connected to one of said input and said output.

36. (original) The torque converter of claim 34, wherein said ring is connected with the input of said damper.

37. (original) The torque converter of claim 33, wherein said ring consists of a material selected from the group consisting of metallic and plastic substances.

38. (Currently amended) ~~The~~ A hydraulic torque converter ~~of claim 32~~, comprising:

a housing arranged to rotate about a predetermined axis, to confine a supply of hydraulic fluid and to receive torque from an output element of a prime mover;

a pump disposed in and arranged to rotate with said housing about said axis;

an annular turbine coaxial with said pump, disposed in said housing and arranged to receive torque from the fluid in said housing in response to rotation of said pump;

a rotary input element coaxial with said housing;

a rotary output member arranged to transmit torque between said input element and at least one of said pump, said turbine and said housing;

a bypass clutch engageable to transmit force between said pump and said turbine during predetermined stages of operation of the torque converter; and

at least one torsional vibration damper in a power flow between said housing and said output member, including an input, an output coaxial with said housing and said input and rotatable relative to said input, and energy storing means arranged to oppose rotation of said input and said output relative to each other;

wherein said energy storing means includes an annulus of coil springs and means for limiting the movability of said coil springs radially of said axis, and wherein said means for limiting includes a preshaped annular member and said coil springs have convolutions spacedly surrounding said preshaped annular

member.

39. (original) The torque converter of claim 38, wherein said annular member includes end portions which are affixed to each other by at least one of the undertakings including bonding, hooking and nesting.

40. (original) The torque converter of claim 38, wherein at least one of said input and said output includes means for locating said annular member relative to said input and said output in at least one of directions including radially of said axis and in the direction of said axis.

41. (original) The torque converter of claim 40, wherein said locating means includes an annular array of discrete projections provided on said at least one of said input and said output.

42. (original) The torque converter of claim 41, wherein said annular member is tensioned by said projections.

43. (original) The torque converter of claim 41, wherein said discrete projections include deformed portions of said input.

44. (original) The torque converter of claim 33, wherein said ring is a wire with a diameter d, said convolutions have inner diameters D and the ratio of d to D is determined by the relationship $0.8*D>d>0.2*D$.

45. (original) The torque converter of claim 33, wherein said ring is a wire with a diameter d, said convolutions have inner diameters D and the ratio of

d to D is determined by the relationship 0.6*D>d>0.3*D.

46. (currently amended) The torque converter of claim 7 ~~1~~, wherein said energy storing means includes a plurality of springs each received in a recess of said input, said input further having at least substantially radial arms alternating with said recesses as seen in a circumferential direction of said damper and said output including entraining portions cooperating with said arms to stress said springs in response to rotation of at least one of said input and said output relative to the other thereof.

47. (original) The torque converter of claim 46, wherein at least one of said arms and said entraining portions has surfaces at least partially conforming to the surfaces of adjacent portions of said springs.

48. (original) The torque converter of claim 46, wherein at least one of said springs is installed in stressed conditions between two of said arms.

49. (original) The torque converter of claim 46, wherein at least one of said springs is installed in stressed condition between two of said entraining portions.

50. (original) The torque converter of claim 46, wherein said recesses are bounded by surfaces provided on said input and making right angles with each other.